FIG. 1

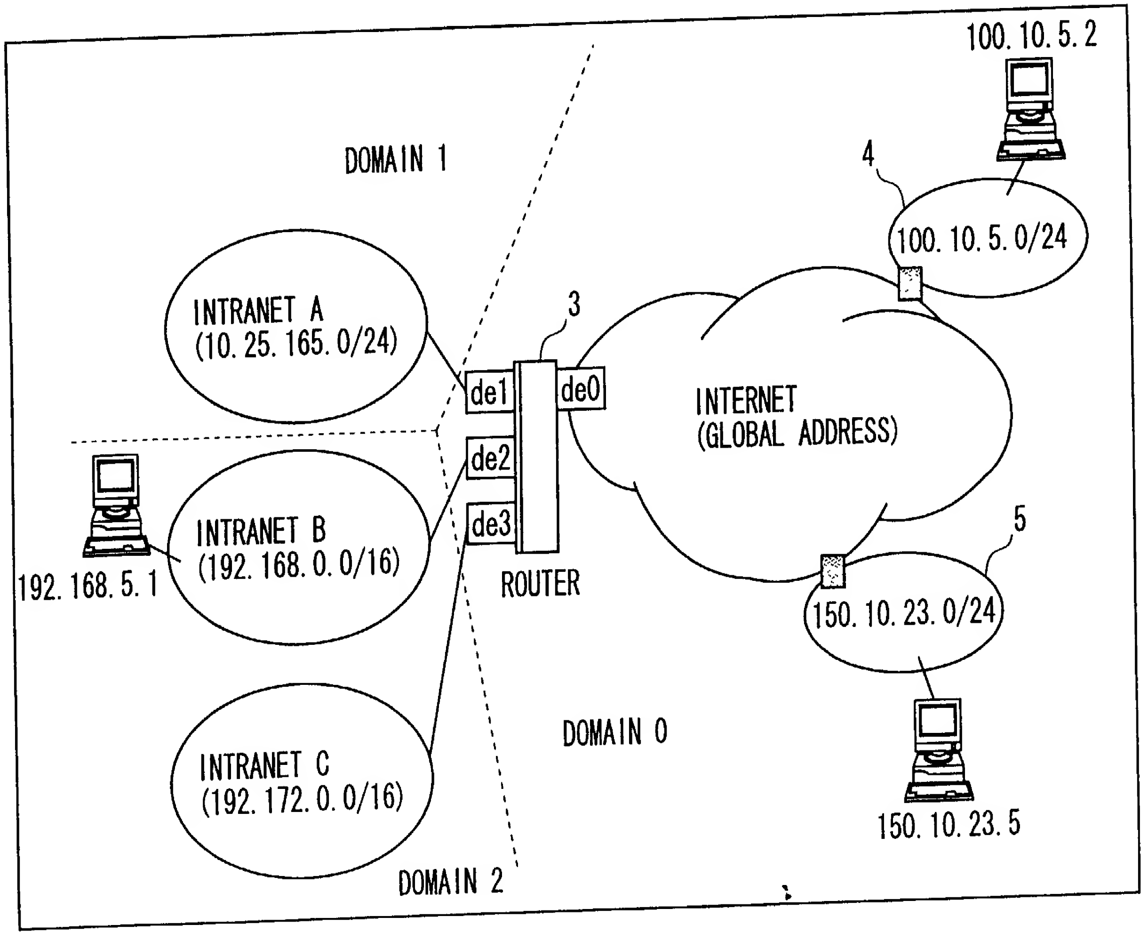
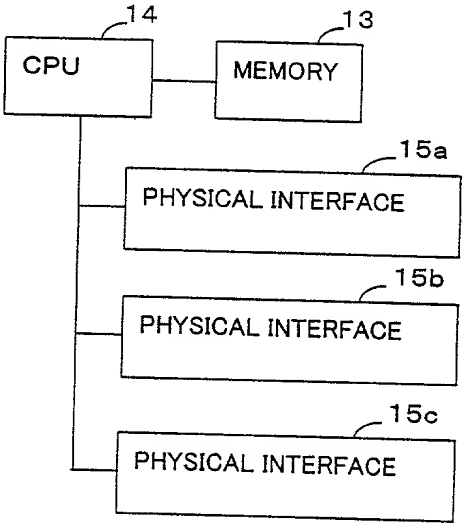

DOMAIN 1
INTRANET A
(10. 25. 165. 0/24)
INTRANET B
(192. 168. 0. 0/16)
192. 168. 5. 1
INTRANET C
(192. 172. 0. 0/16)
DOMAIN 2
3
de1
de2
de3
de0
ROUTER
INTERNET
(GLOBAL ADDRESS)
DOMAIN 0
4
100. 10. 5. 0/24
100. 10. 5. 2
5
150. 10. 23. 0/24
150. 10. 23. 5

FIG.2


14
CPU
13
MEMORY
15a
PHYSICAL INTERFACE
15b
PHYSICAL INTERFACE
15c
PHYSICAL INTERFACE

09825478 .010201

FIG. 3

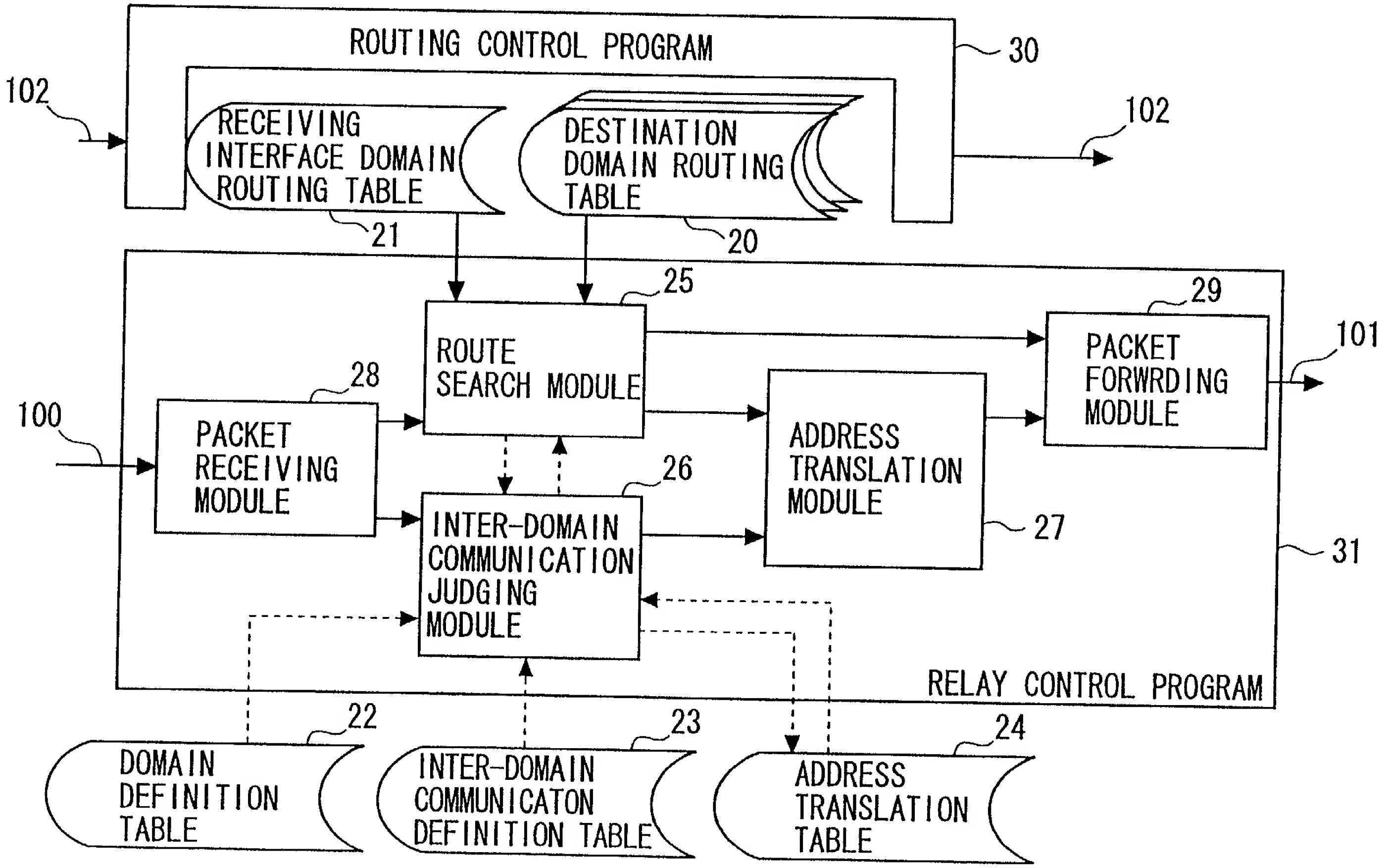

ROUTING CONTROL PROGRAM
30
102
102
RECEIVING INTERFACE DOMAIN ROUTING TABLE
21
DESTINATION DOMAIN ROUTING TABLE
20
25
ROUTE SEARCH MODULE
29
PACKET FORWRDING MODULE
101
28
PACKET RECEIVING MODULE
100
26
INTER-DOMAIN COMMUNICATION JUDGING MODULE
ADDRESS TRANSLATION MODULE
27
31
RELAY CONTROL PROGRAM
22
DOMAIN DEFINITION TABLE
23
INTER-DOMAIN COMMUNICATON DEFINITION TABLE
24
ADDRESS TRANSLATION TABLE

FIG. 4

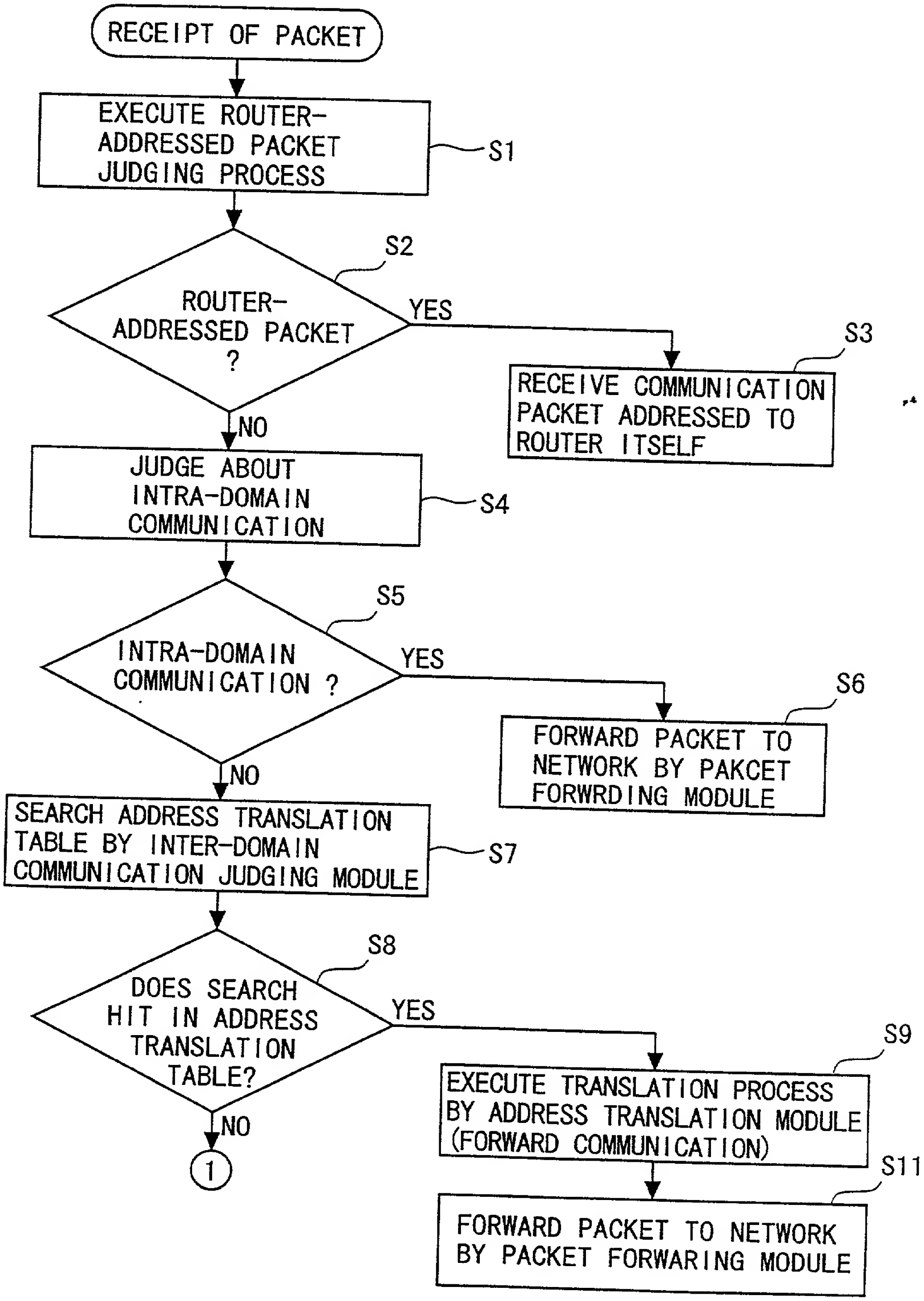

RECEIPT OF PACKET
EXECUTE ROUTER-ADDRESSED PACKET JUDGING PROCESS
S1
S2
ROUTER-ADDRESSED PACKET ?
YES
S3
RECEIVE COMMUNICATION PACKET ADDRESSED TO ROUTER ITSELF
NO
JUDGE ABOUT INTRA-DOMAIN COMMUNICATION
S4
S5
INTRA-DOMAIN COMMUNICATION ?
YES
S6
FORWARD PACKET TO NETWORK BY PAKCET FORWRDING MODULE
NO
SEARCH ADDRESS TRANSLATION TABLE BY INTER-DOMAIN COMMUNICATION JUDGING MODULE
S7
S8
DOES SEARCH HIT IN ADDRESS TRANSLATION TABLE?
YES
S9
EXECUTE TRANSLATION PROCESS BY ADDRESS TRANSLATION MODULE (FORWARD COMMUNICATION)
NO
1
S11
FORWARD PACKET TO NETWORK BY PACKET FORWARING MODULE

FIG. 5

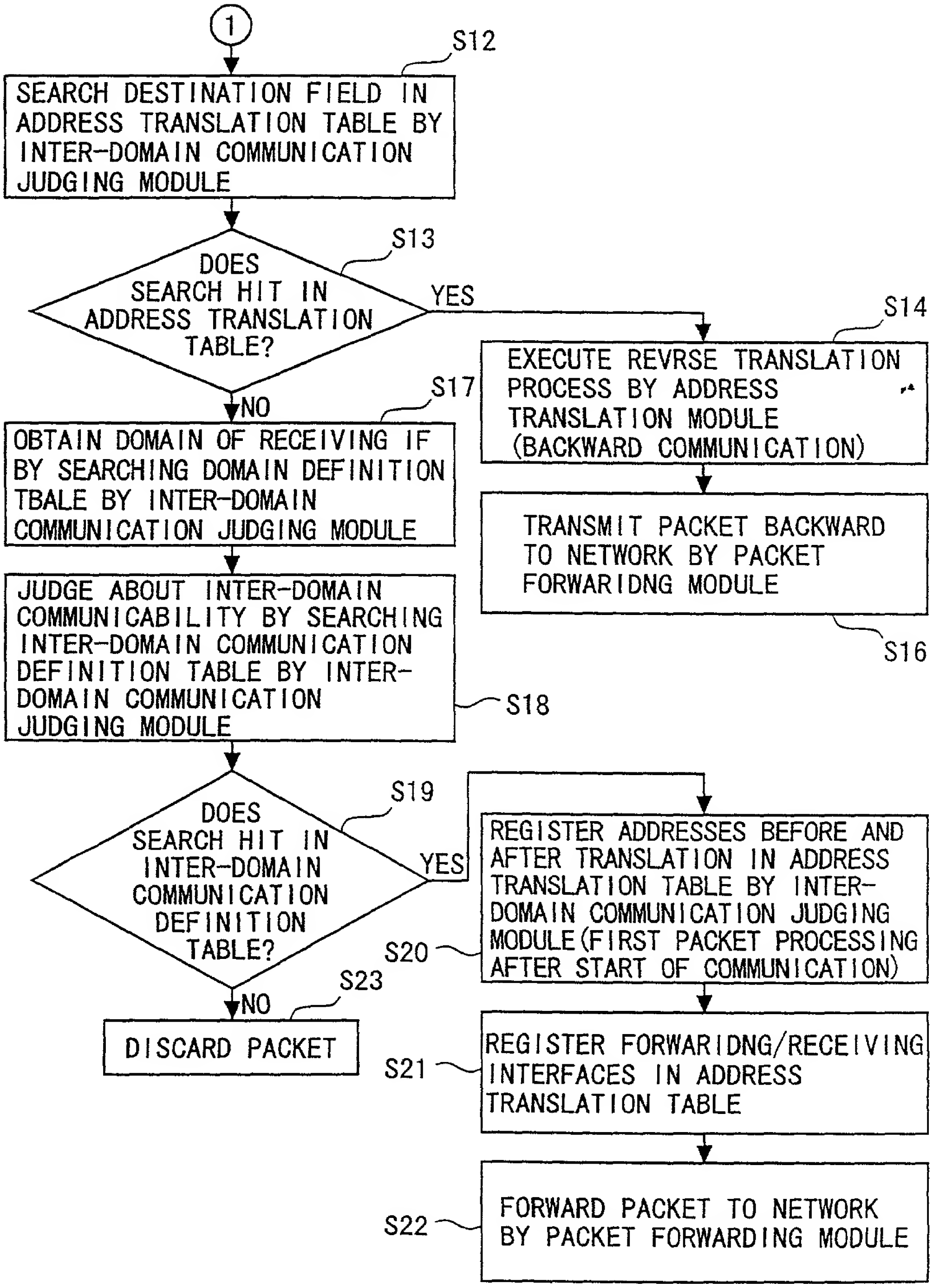

1
S12
SEARCH DESTINATION FIELD IN ADDRESS TRANSLATION TABLE BY INTER-DOMAIN COMMUNICATION JUDGING MODULE
S13
DOES SEARCH HIT IN ADDRESS TRANSLATION TABLE?
YES
NO
S14
EXECUTE REVRSE TRANSLATION PROCESS BY ADDRESS TRANSLATION MODULE (BACKWARD COMMUNICATION)
TRANSMIT PACKET BACKWARD TO NETWORK BY PACKET FORWARIDNG MODULE
S16
S17
OBTAIN DOMAIN OF RECEIVING IF BY SEARCHING DOMAIN DEFINITION TBALE BY INTER-DOMAIN COMMUNICATION JUDGING MODULE
JUDGE ABOUT INTER-DOMAIN COMMUNICABILITY BY SEARCHING INTER-DOMAIN COMMUNICATION DEFINITION TABLE BY INTER-DOMAIN COMMUNICATION JUDGING MODULE
S18
S19
DOES SEARCH HIT IN INTER-DOMAIN COMMUNICATION DEFINITION TABLE?
YES
NO
S20
REGISTER ADDRESSES BEFORE AND AFTER TRANSLATION IN ADDRESS TRANSLATION TABLE BY INTER-DOMAIN COMMUNICATION JUDGING MODULE (FIRST PACKET PROCESSING AFTER START OF COMMUNICATION)
S23
DISCARD PACKET
S21
REGISTER FORWARIDNG/RECEIVING INTERFACES IN ADDRESS TRANSLATION TABLE
S22
FORWARD PACKET TO NETWORK BY PACKET FORWARDING MODULE

FIG.6

I/F NUMBER	DOMAIN NUMBER
de0	0
de1	1
de2	2
de3	2

FIG. 7

SOURCE DOMAIN → DESTINATION DOMAIN	COMMUNICABILITY (1:PERMITTED 0:PROHIBITED),	TRANSLATION RULE
DOMAIN 0→DOMAIN 1	0	–
DOMAIN 0→DOMAIN 2	0	–
DOMAIN 1→DOMAIN 0	1	NAT
DOMAIN 1→DOMAIN 2	0	–
DOMAIN 2→DOMAIN 0	1	NAT
DOMAIN2→DOMAIN 1	1	NAT

FIG.8

DESTINATION NETWORK	NEXT HOP GATEWAY	OUTPUT INTERFACE
100.10.5.0	120.10.4.1	de0
100.10.6.0	120.10.4.120	de0
120.10.4.0	120.10.4.120	de0

FIG.9

DESTINATION NETWORK	NEXT HOP GATEWAY	OUTPUT INTERFACE
10.25.55.0	10.25.55.1	de1
10.25.165.0	10.25.55.165	de1
10.25.166.0	10.25.55.166	de1

FIG.10

DESTINATION NETWORK	NEXT HOP GATEWAY	OUTPUT INTERFACE
192.168.100.0	192.168.100.1	de2
192.168.250.0	192.168.100.250	de2
192.168.251.0	192.168.100.251	de2
192.172.30.0	192.168.30.1	de3
192.172.38.0	192.168.30.38	de3

FIG.11

BEFORE TRANSLATION			AFTER TRANSLATION		
SOURCE ADDRESS	DESTINATION ADDRESS	RECEIVING I/F	SOURCE ADDRESS	DESTINATION ADDRESS	FORWARDING I/F
192.168.5.1	100.10.5.2	de2	120.10.4.2	100.10.5.2	de0
192.172.3.1	100.10.6.7	de3	120.10.4.3	100.10.6.7	de0

FIG. 12

DESTINATION NETWORK	NEXT HOP GATEWAY	OUTPUT INTERFACE	DOMAIN NUMBER
100.10.5.0	120.10.4.1	de0	0
100.10.6.0	120.10.4.120	de0	0
120.10.4.0	120.10.4.120	de0	0
10.25.55.0	10.25.55.1	de1	1
10.25.165.0	10.25.55.165	de1	1
10.25.166.0	10.25.55.166	de1	1
192.168.100.0	192.168.100.1	de2	2
192.168.250.0	192.168.100.250	de2	2
192.168.251.0	192.168.100.251	de2	2
192.172.30.0	192.168.30.1	de3	2
192.172.38.0	192.168.30.38	de3	2

FIG. 13

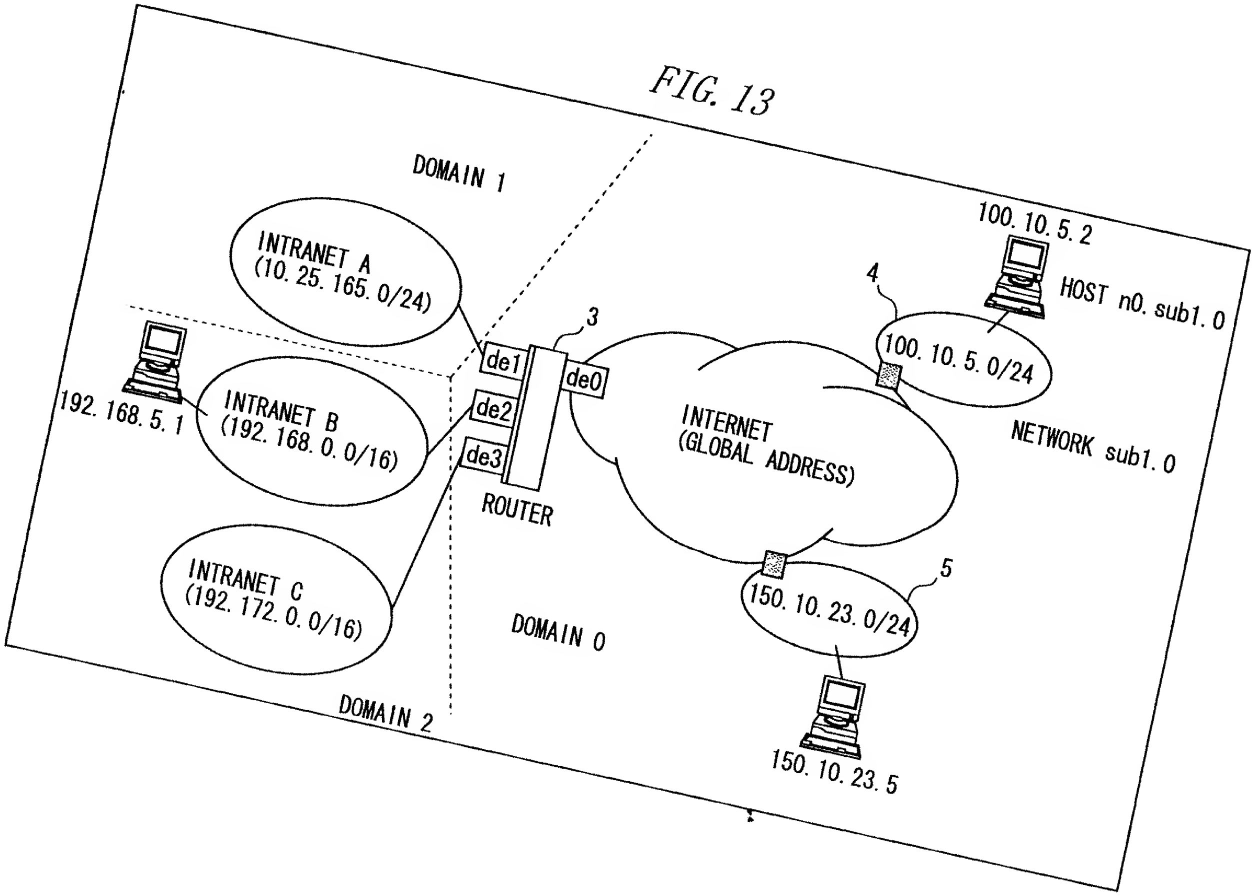

DOMAIN 1
INTRANET A
(10. 25. 165. 0/24)
192. 168. 5. 1
INTRANET B
(192. 168. 0. 0/16)
INTRANET C
(192. 172. 0. 0/16)
DOMAIN 2
de1
de2
de3
3
de0
ROUTER
DOMAIN 0
INTERNET
(GLOBAL ADDRESS)
4
100. 10. 5. 2
HOST n0. sub1. 0
100. 10. 5. 0/24
NETWORK sub1. 0
5
150. 10. 23. 0/24
150. 10. 23. 5

FIG. 14

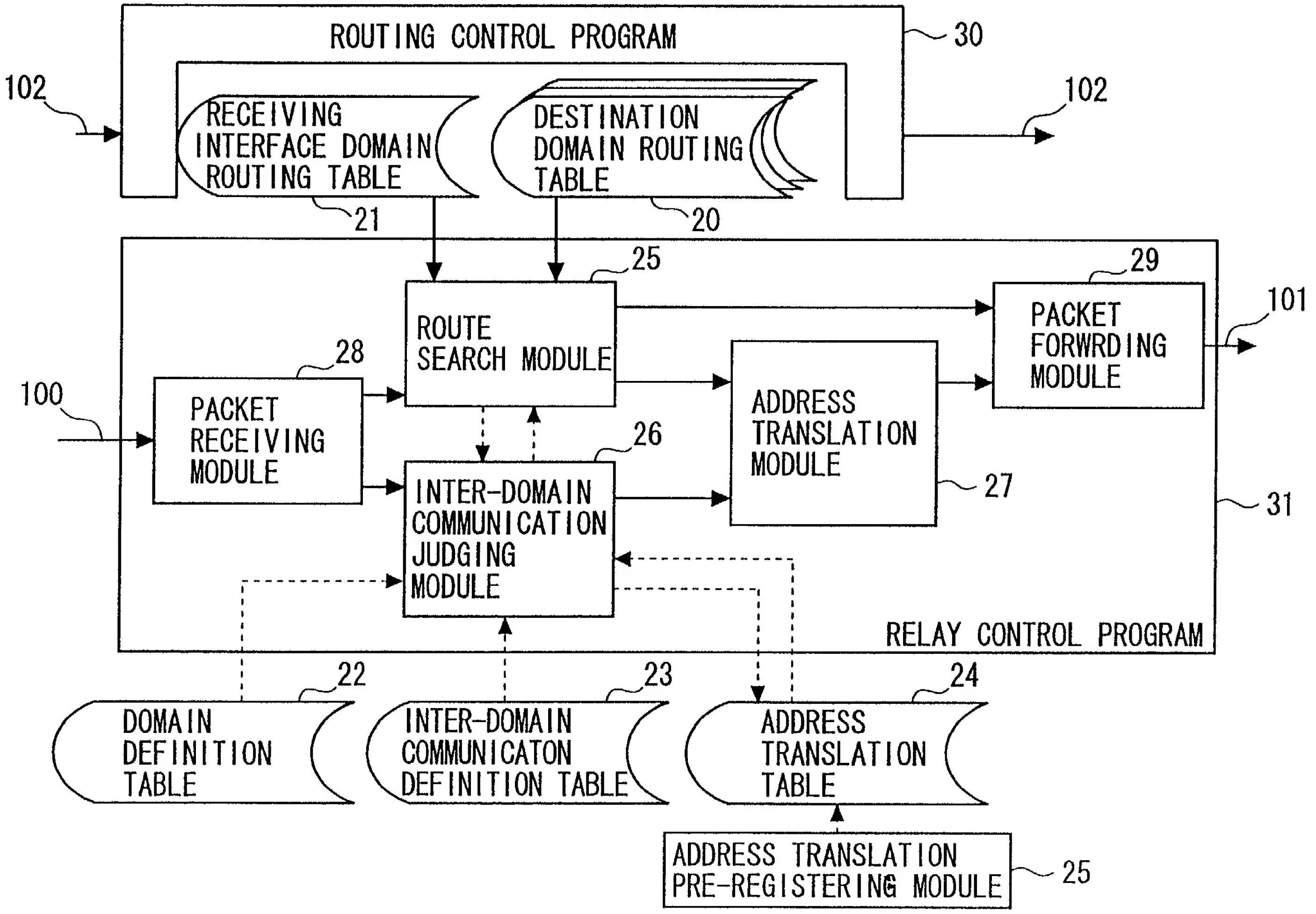

ROUTING CONTROL PROGRAM
30
102
102
RECEIVING INTERFACE DOMAIN ROUTING TABLE
21
DESTINATION DOMAIN ROUTING TABLE
20
25
29
101
ROUTE SEARCH MODULE
PACKET FORWRDING MODULE
28
100
PACKET RECEIVING MODULE
ADDRESS TRANSLATION MODULE
26
INTER-DOMAIN COMMUNICATION JUDGING MODULE
27
31
RELAY CONTROL PROGRAM
22
23
24
DOMAIN DEFINITION TABLE
INTER-DOMAIN COMMUNICATON DEFINITION TABLE
ADDRESS TRANSLATION TABLE
ADDRESS TRANSLATION PRE-REGISTERING MODULE
25

FIG. 15

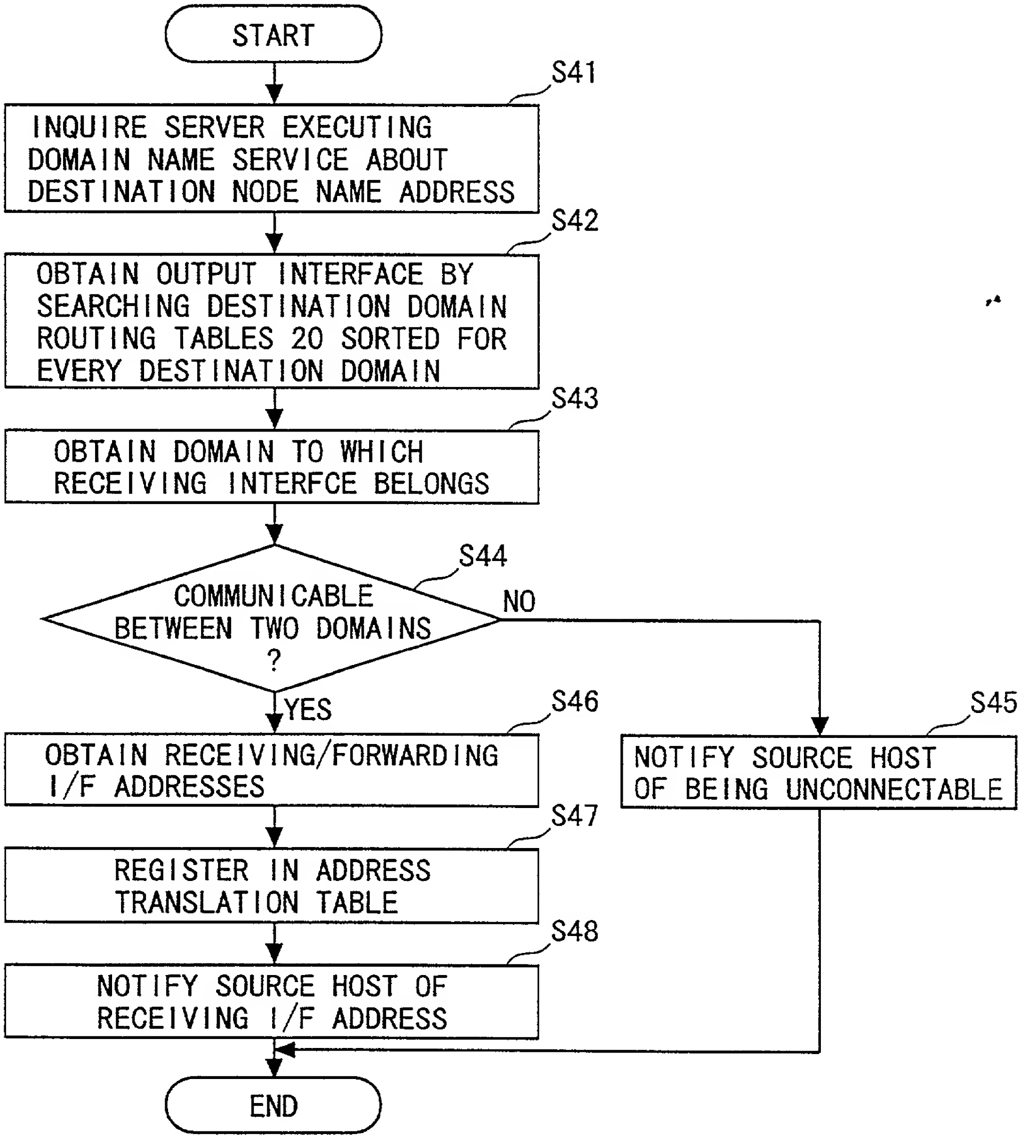

START
S41
INQUIRE SERVER EXECUTING DOMAIN NAME SERVICE ABOUT DESTINATION NODE NAME ADDRESS
S42
OBTAIN OUTPUT INTERFACE BY SEARCHING DESTINATION DOMAIN ROUTING TABLES 20 SORTED FOR EVERY DESTINATION DOMAIN
S43
OBTAIN DOMAIN TO WHICH RECEIVING INTERFCE BELONGS
S44
COMMUNICABLE BETWEEN TWO DOMAINS ?
NO
YES
S45
NOTIFY SOURCE HOST OF BEING UNCONNECTABLE
S46
OBTAIN RECEIVING/FORWARDING I/F ADDRESSES
S47
REGISTER IN ADDRESS TRANSLATION TABLE
S48
NOTIFY SOURCE HOST OF RECEIVING I/F ADDRESS
END

FIG. 16

BEFORE TRANSLATION			AFTER TRANSLATION		
SOURCE ADDRESS	DESTINATION ADDRESS	RECEIVING I/F	SOURCE ADDRESS	DESTINATION ADDRESS	FORWARDING I/F
192.168.5.1	192.168.5.2	de2	120.10.4.2	100.10.5.2	de0

FIG. 17

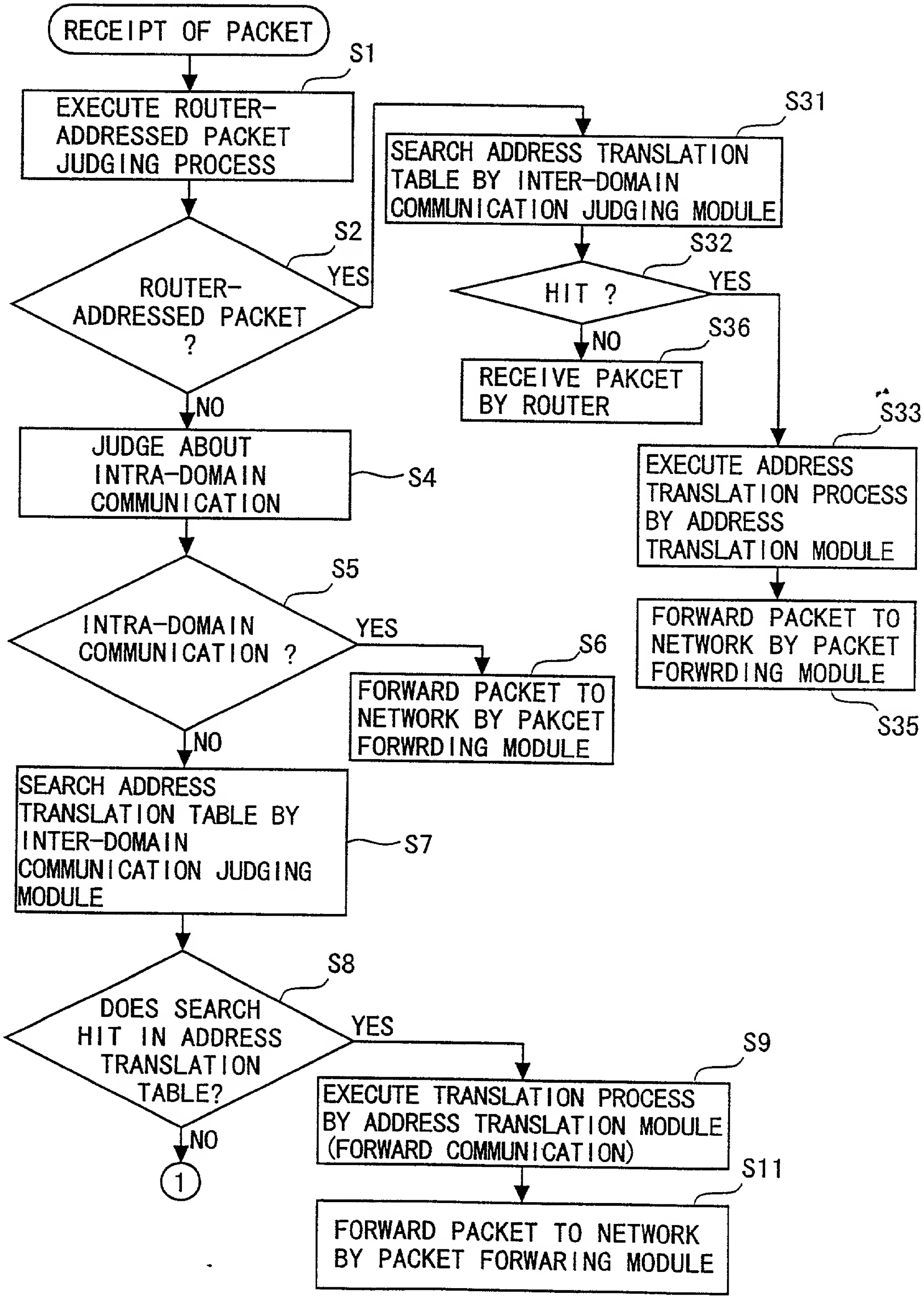
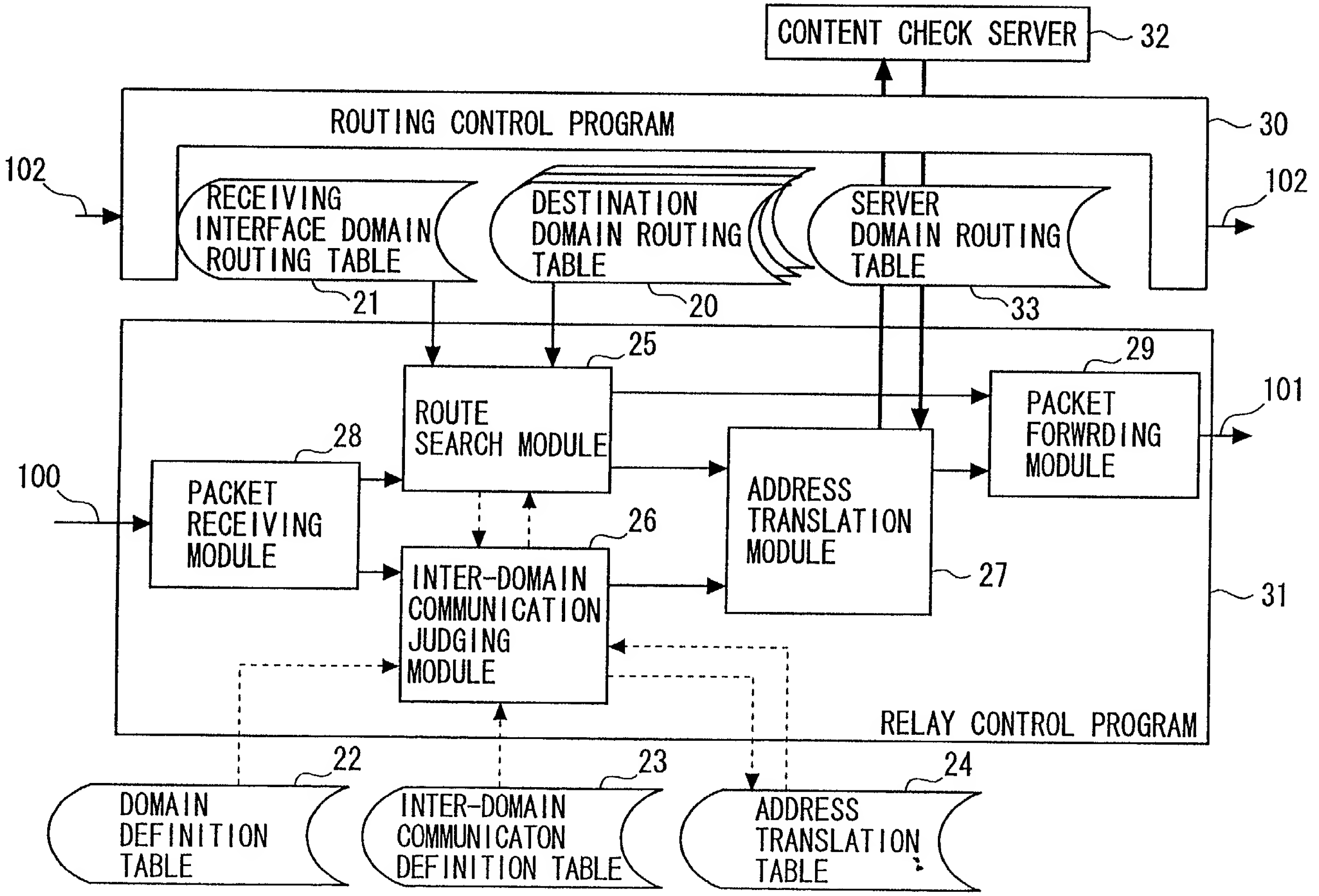

RECEIPT OF PACKET
S1
EXECUTE ROUTER-ADDRESSED PACKET JUDGING PROCESS
S2
ROUTER-ADDRESSED PACKET ?
YES
NO
S31
SEARCH ADDRESS TRANSLATION TABLE BY INTER-DOMAIN COMMUNICATION JUDGING MODULE
S32
HIT ?
YES
NO
S36
RECEIVE PAKCET BY ROUTER
S33
EXECUTE ADDRESS TRANSLATION PROCESS BY ADDRESS TRANSLATION MODULE
FORWARD PACKET TO NETWORK BY PACKET FORWRDING MODULE
S35
JUDGE ABOUT INTRA-DOMAIN COMMUNICATION
S4
S5
INTRA-DOMAIN COMMUNICATION ?
YES
NO
S6
FORWARD PACKET TO NETWORK BY PAKCET FORWRDING MODULE
SEARCH ADDRESS TRANSLATION TABLE BY INTER-DOMAIN COMMUNICATION JUDGING MODULE
S7
S8
DOES SEARCH HIT IN ADDRESS TRANSLATION TABLE?
YES
NO
①
S9
EXECUTE TRANSLATION PROCESS BY ADDRESS TRANSLATION MODULE (FORWARD COMMUNICATION)
S11
FORWARD PACKET TO NETWORK BY PACKET FORWARING MODULE

FIG. 18


CONTENT CHECK SERVER
32
ROUTING CONTROL PROGRAM
30
102
RECEIVING INTERFACE DOMAIN ROUTING TABLE
21
DESTINATION DOMAIN ROUTING TABLE
20
SERVER DOMAIN ROUTING TABLE
33
102
25
ROUTE SEARCH MODULE
29
PACKET FORWRDING MODULE
101
100
28
PACKET RECEIVING MODULE
ADDRESS TRANSLATION MODULE
26
INTER-DOMAIN COMMUNICATION JUDGING MODULE
27
31
RELAY CONTROL PROGRAM
22
DOMAIN DEFINITION TABLE
23
INTER-DOMAIN COMMUNICATON DEFINITION TABLE
24
ADDRESS TRANSLATION TABLE

09852470.010201

FIG.19

PRIOR ART

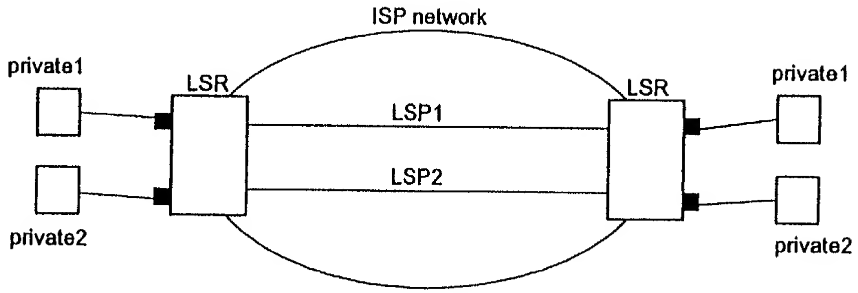

ISP network
private1
LSR
LSP1
LSP2
LSR
private1
private2
private2

FIG.20

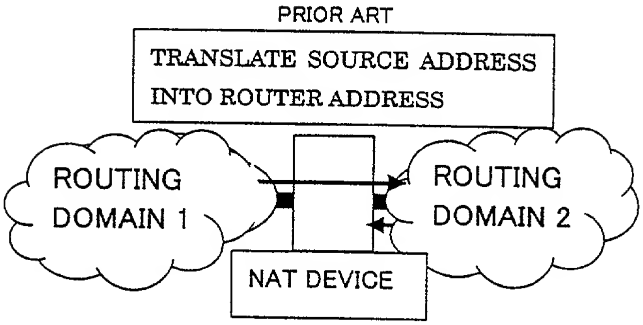
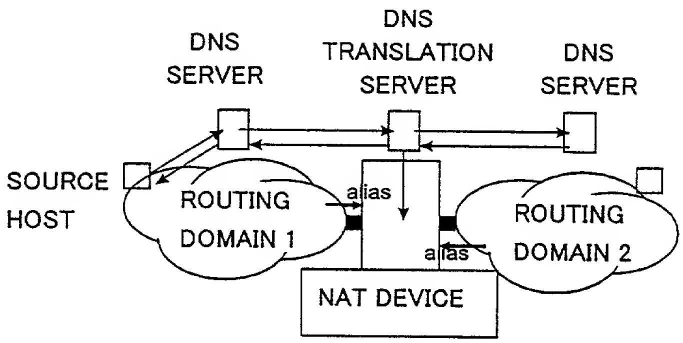

PRIOR ART
TRANSLATE SOURCE ADDRESS INTO ROUTER ADDRESS
ROUTING DOMAIN 1
ROUTING DOMAIN 2
NAT DEVICE

FIG.21

PRIOR ART

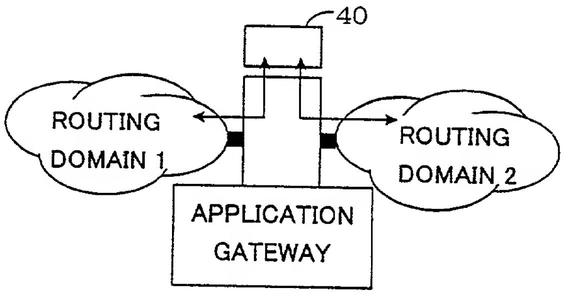

DNS
SERVER
DNS
TRANSLATION
SERVER
DNS
SERVER
SOURCE
HOST
ROUTING
DOMAIN 1
alias
ROUTING
DOMAIN 2
alias
NAT DEVICE

09825479 .010304

End/22

FIG.22

PRIOR ART



40
ROUTING DOMAIN 1
ROUTING DOMAIN 2
APPLICATION GATEWAY